



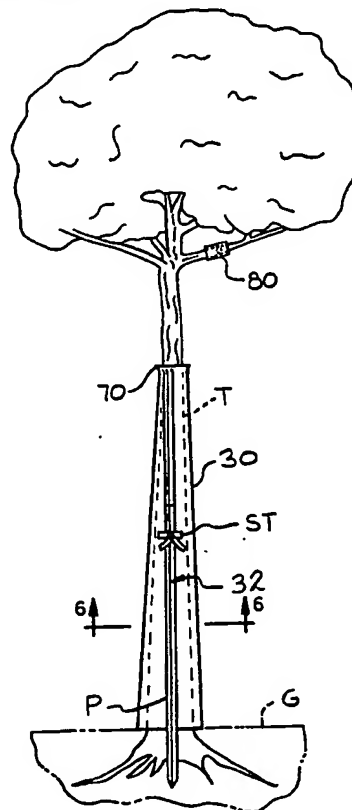
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/US92/07052</p> <p>(22) International Filing Date: 21 August 1992 (21.08.92)</p> <p>(30) Priority data: 748,633 22 August 1991 (22.08.91) US</p> <p>(60) Parent Application or Grant (63) Related by Continuation US 748,633 (CIP) Filed on 22 August 1991 (22.08.91)</p> <p>(71)(72) Applicants and Inventors: FRIESNER, Charles, E. [US/US]; 6535 Kemner Road, Pemberville, OH 43450 (US). FRIESNER, Todd, E. [US/US]; 411 West Second Street, Perrysburg, OH 43551 (US).</p>	<p>(74) Agent: PURDUE, David, C.; Purdue Law Offices, 2735 N. Holland-Sylvania Road, Suite B-2, Toledo, OH 43615-1844 (US).</p> <p>(81) Designated States: US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, SE).</p> <p>Published <i>With international search report.</i></p>	

(54) Title: SHELTER FOR SEEDLINGS, SAPLINGS, TREES AND THE LIKE

(57) Abstract

A tree shelter (30) comprising a tube shaped piece of resilient, elastomeric material (30) is disclosed. The tree shelter (30) has a longitudinally extending slit defined by first and second opposed edges (16, 18) of the material. The shelter (30) can be opened anywhere along its length by moving the opposed edges (16, 18) apart. Apertures (41) are provided for receiving one or more support ties (ST) for securing the shelter (30) to a support (P) such as a post (P), stake or the like. The apertures (41) are positioned, relative to the edges (16, 18), so that, when the shelter (30) is secured by one or more support ties (ST) to a support (P), the shelter (30) can be opened by moving the first and second edges (16, 18) apart and wherein, when the edges (16, 18) are released, the shelter (30) returns to its relaxed state in which it has overlapping portions (20).



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TITLE**SHELTER FOR SEEDLINGS, SAPLINGS, TREES AND THE LIKE****BACKGROUND OF THE INVENTION**

5 1. Field of the Invention.

The present invention relates generally to devices for covering and protecting seedlings, saplings and trees. More specifically, the invention relates to preformed, resilient tree shelters which are easy to use and which permit easy
10 inspection of the seedling, saplings, trees and the like.

2. Description of the Prior Art

Several approaches to protecting vulnerable portions of trees and the like are known in the prior art. For example, it is known to wrap material around the trunk of a tree and
15 such material might be impregnated with a chemical to discourage insects and the like from attacking the tree. Such material, however, is incapable, generally, of protecting the trunk from physical trauma. Moreover, the application of such material to a tree trunk is time
20 consuming and so is the removal of such material.

Tar and other compositions have been applied to the stubs of cut limbs to prevent infestation of the wood by insects, fungus or the like. Again, these compositions do not provide any significant degree of protection against
25 damage from physical trauma to a tree trunk or the like.

US Patent No. 107,960 discloses a Tree and Plant Protector comprising a thin flexible sheet of wood which can be bent into cylindrical form and secured around the trunk of a tree with strings. In order to open the protector, one
30 must untie the strings.

US Patent No. 4,899,486 discloses a tree shelter comprising a twin walled extrusion in a cylindrical form. The cylindrical tree shelter is circumferentially continuous and can only be removed from a tree by being lifted off of
35 the tree, if it hasn't topped out with branches or, if it has topped out, the tree shelter must be cut off of the tree and cannot, in that case, be reused.

UK Patent application No. 2,212,043A discloses a tree

shelter which comprises a flexible sheet which is formed into a tree shelter shape, i.e., cylindrical, and retained in that shape by collars which include ties for securing the shelter to a stake or the like. In order to remove the tree
5 shelter from a tree that has topped out, the collars must be released.

SUMMARY OF THE INVENTION

The present invention is a tree shelter comprised of a
10 tube shaped piece of thermoplastic material having a longitudinally extending slit which facilitates placement of the shelter on a tree and removal of the shelter from a tree, even if the tree has topped out, without damage to the shelter. In a preferred embodiment, the shelter is rolled up
15 on itself so that a portion of the sidewall of the shelter, adjacent the slit, overlaps an opposed portion of the sidewall of the shelter, adjacent the slit. A longitudinally extending groove or notch is provided to increase the rigidity of the tree shelter over its length. The groove
20 also serves a hinge function to facilitate opening the tree shelter, when desired. The groove also can be employed to engage a stake, or the like, to support the tree shelter relative to a tree.

It is therefore a primary object of the present
25 invention to provide a tree shelter which can be easily and quickly applied to seedlings, saplings and trees, including trees that have topped out and could not be fitted with a tubular tree shelter which did not have a longitudinally extending slit.

30 Another object of the invention is to provide a tree shelter which can be quickly and easily opened, anywhere along its length, even when it is positioned around a seedling, sapling or tree and tied to a stake, without the need to release ties, clips bands and the like.

35 It is a further object of the present invention to provide a tree shelter which is self closing because it returns to and retains a cylindrical shape after it has been opened and/or removed from a tree.

It is a further object of the present invention to provide a tree shelter which can be removed from a tree that has topped out without damage to the tree shelter so that it can be reused.

5 It is a further object of the invention to provide a tree shelter which can expand to accommodate a tree trunk which outgrows the nominal diameter of the tree shelter, to prevent girdling of trees such as can happen with prior art, fixed diameter tree shelters.

10 It is a further object of the invention to provide a tree shelter which can be nested with several other identical tree shelters for economical transportation.

Another object of the present invention is to provide a tree shelter which is economical to manufacture.

15 An important advantage of the present invention is the provision of a trunk shelter which is easily applied to a seedling, sapling or the like and which can be easily opened and closed, even while it is positioned about a seedling or the like and tied to a stake.

20 These and other objects and advantages of the present invention will no doubt become apparent to those skilled in the art after they have read the following detailed description of the preferred embodiment which is illustrated by the various drawing figures.

25

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a view of a tree shelter according to the invention, applied to the trunk of a young tree.

Fig. 2 is a perspective of the shelter, apart from a tree.

30 Fig. 3 is a view, in section, of the shelter shown in Fig. 2, taken along the line 3-3, showing the overlapping edges. Fig. 4 is a view, in section, of the shelter shown in Fig. 1, taken along the line 4-4.

Fig. 5 is a view of a tree shelter including a
35 longitudinally extending V-shaped groove.

Fig. 6 is a view, in section, of the shelter shown in Fig. 5, taken along the line 6-6.

Fig. 7 is a cross sectional view through a closed tree

shelter according to the invention, with a tree and stake shown in phantom.

Fig. 8 is a cross sectional view through an opened tree shelter according to the invention, with a tree and stake

5 shown in phantom.

Fig. 9 is a cross sectional view through a tree shelter according to the invention, with a single longitudinally extending surface, with a tree and stake shown in phantom

Fig. 10 is a cross sectional view through a tree shelter according to the invention, illustrating an out-turned lip at the upper edge of the tree shelter.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A tree shelter according to the present invention is indicated generally at 10 in Fig. 1. The shelter 10 is illustrated applied around the trunk T of a tree. The shelter 10 has an upper end 12 and a lower end 14. In using the shelter 10, one would normally position it around a tree trunk T (or a sapling or a seedling) as shown in Fig. 1, i.e., with the lower end 14 adjacent to or touching the ground, G.

Referring now to Fig. 2, the shelter 10 has first and second longitudinally extending edges, 16 and 18. Edge 16 is captive within the shelter 10 and edge 18 is outside of the shelter 10. As clearly shown in Figs. 2 and 3, a portion 20 of the sidewall, adjacent to the edge 18, overlaps a substantial portion 22 of the sidewall of the shelter, adjacent to the edge 16. The shelter 10 is preferably formed of a resilient, flexible material so that portions 20 and 22 can slide relative to one another so that the internal diameter of the shelter 10 can vary over its length to accommodate the various diameters of a tree trunk over its length.

A given shelter 10 will have a given internal diameter D as shown in Fig. 3, when the shelter is relaxed. The internal diameter can be expanded, for example, when the shelter 10 opened to be applied to the trunk T of a tree. As further shown in Fig. 4, the shelter 10 can be opened by

pulling the edges 16 and 18 to separate them as shown in phantom lines. When opened, the shelter 10 can be easily applied to or removed from the trunk of a tree, or the trunk can be inspected. Because the shelter 10 can open, it will not damage a tree by constricting or girdling it. If a tree trunk with a shelter according to the present invention grows beyond the nominal diameter of the shelter 10, the edges 16 and 18 will move and the effective diameter of the shelter 10 will increase, where needed, to prevent girdling.

Production of a shelter according to the invention is preferably carried out on apparatus including conventional polymer extrusion equipment. A tube having a given diameter is continuously extruded from a batch of polyethylene or polypropylene and passed through a vacuum tank where the exterior surface is cooled, creating a temperature differential between the interior surface and the exterior surface of the tube. The exterior surface is heated, the interior surface is cooled, or both, to reduce the temperature differential so that, after the tube is slit longitudinally, the tube will curl up on itself a controlled amount, creating areas where portions of the side wall overlap other portions of the side wall, effectively reducing the diameter of the tube to a diameter which is less than the given diameter. It will be readily appreciated by those skilled in the art that the degree of overlap can be controlled by controlling the temperature differential that exists between the interior and exterior surfaces when the tube is slit and the slit edges are released. Thereafter, the slit tube can be cut into individual lengths, each constituting a shelter according to the instant invention.

An alternative method for producing a shelter according to the invention can be carried out on sheet stock of a suitable polymeric material such as polyethylene or polypropylene. A piece of sheet stock having a width corresponding with the width of a shelter, if it was laid out flat, is rolled up on itself to produce a preform having a desired degree of overlap and the preform is placed into

a mold in which the desired degree of overlap is maintained. The mold can be preheated or it is heated to a temperature corresponding with a transition temperature for the sheet stock material so that, upon cooling, the preform will retain its shape when it is removed from the mold. Individual shelters can be cut to length from the finished part or the preforms can be produced in lengths corresponding with the desired length of the shelters to be produced.

Other ways for producing shelters according to the instant invention will occur to those skilled in the art. Presently, the preferred method for fabricating shelters according to the invention is the extrusion technique described above and the preferred material is polyethylene.

Referring now to Fig. 5, a shelter including a longitudinally extending groove is indicated generally at 30. The shelter 30 is similar in most respects to the shelter 10. However, the shelter 30 additionally includes support engaging means indicated at 32 (Fig. 6) for engaging a support such as a stake or post indicated at P. The support engaging means 32 comprises two longitudinally extending surfaces 34 and 36 which engage two surfaces 38 and 40 of the post P. Preferably, one or more support ties ST are provided to give further support for the tree shelter 30 and the tree within it. The support tie may be string, rope, web or the like or it may be a cable tie arrangement, with or without a locking feature. The use of a post P and a support tie ST are especially preferred when the tree shelter is applied to a seedling because the seedling would not support the tree shelter the way a sapling or a tree could. The support tie ST extends through a pair of apertures 41 adjacent to and on opposite sides of the support engaging means. The shelter 30 may be produced by the methods discussed above for producing the shelter 10. In the case of extrusion of a tube, the extrusion orifice may be shaped to produce support engaging means 32 comprising two longitudinally extending surfaces 34 and 36, or any other suitable support engaging means such as a single

longitudinally extending surface (see Fig. 9). In the case where the shelter 30 is to be produced by molding, the mold surfaces may be suitably shaped to produce support engaging means. It will be readily appreciated by those skilled in the art that other configurations are suitable for carrying out the function of the support engaging means.

Referring now to Fig. 4, it can be seen that the shelter 10 has a generally smooth inside surface 49 while the tree trunk T and most tree trunks generally, have a somewhat irregular surface. As a consequence, the shelter 10, when applied to a tree trunk, allows air to circulate around the tree trunk, between the inside surface 49 of the shelter 10 and the tree trunk, thereby not interfering with respiration through the bark on the tree trunk. With reference to Fig. 6, the shelter 30 including the support engaging means 32 defines a large air space between itself and the tree trunk T. Even if the tree exceeds the nominal inside diameter of the shelter, edges 40 and 42 of the shelter will slide relative to one another and the interior diameter of the shelter 30 will effectively increase in contrast to prior art shelters which have fixed diameters and which will damage a tree by girdling it if it exceeds the diameter of the inside of the shelter.

The wall thickness, the density and the color of a shelter according to the invention can be controlled to advantage. For example, different colored shelters can be used on different kinds of trees, especially those which require different care, to assist persons who would not otherwise be able to readily differentiate between species of trees. The thickness of a tree shelter according to the invention will be dictated to some extent by the strength of the material it is made from as well as its height. In a four foot long shelter made of polyethylene, a wall thickness of 0.050" (50 mils) provides adequate strength. It should be noted that the support engaging means 32 comprising two longitudinally extending surfaces 34 and 36 (Figs. 5-8) gives the tree shelter 30 extra strength and added rigidity by comparison with the tree shelter 10 which

has no support engaging means.

The support engaging means 32 shown in Figs. 5-8 defines two hinge edges 46 shown in Figs. 7 and 8. In Fig. 7, the tree shelter is secured to the post P by support ties ST and edges 42 and 44 overlap to provide a closed tree shelter 30. In Fig. 8, the tree shelter 30 is shown in an open position which is achieved by the application of opening forces, generally as indicated by the arrows in Fig. 7, to the edges 42 and 44 of the shelter 30. First, the opening force would be applied to the edge 42 causing the portion of the shelter 30 between the edge 42 and the support engaging means 32 to pivot, about the adjacent hinge edge 46 from the position shown in Fig. 7 to the position shown in Fig. 8, thereby exposing the edge 44. A similar opening force is applied to the edge 44 causing the portion of the shelter 30 between the edge 44 and the support engaging means 32 to pivot, about the adjacent hinge edge 46 from the position shown in Fig. 7 to the position shown in Fig. 8. In both positions shown in Figs. 7 and 8, the tree shelter 30 remains securely fastened to the post P. When the opening forces are released from the shelter 30 in the open position, the elastic memory of the tree shelter material will cause the tree shelter to return to the closed position shown in Fig. 7.

Another embodiment of support engaging means is shown in Fig. 9. A tree shelter 50 has a generally cylindrical shape with overlapping edges 52 and 54. Support engaging means 56 comprising a longitudinally extending surface 58 with hinge edges 60 on each side of the surface 58. The surface 58 is adjacent to and secured to a post P by a support tie ST which extends through apertures 62. The tree shelter 50 can be opened, as shown in phantom, by the application of opening forces applied first to the edge 52 and then to the edge 54 causing the portions of the shelter 50 adjacent the edges 52 and 54 to pivot about the edge hinges 60 adjacent thereto. When the opening forces are released, the tree shelter will return to the closed position shown in Fig. 9. Like the shelter 30, the shelter

50 can be opened and closed even while it remains secured to the post P. It should be noted that the support engaging means 32 provides more structural rigidity to the shelter 30 than the support engaging means 56 provides to the shelter 50.

Another feature which can be incorporated in a tree shelter according to the invention is the provision of an out-turned lip 70 (Figs. 5 and 10) at the upper end of the shelter 30. This configuration minimizes the chances that the upper end of the tree shelter can cause trauma to the tree or sapling. The out-turned lip feature may be incorporated in the tree shelters 10 and 50, as well. The out-turned lip 70 may be produced by forming the tree shelter 30 without such a lip by extrusion or thermoforming, as discussed above, and heating the end of the tree shelter 30 to a given temperature, deforming the end to produce the lip and cooling the end so that the lip retains its shape. The given temperature will depend upon the material used and various means for heating are well known in the art. For example, the end may be heated by contact with a hot gas stream, a heated fluidized bed or a heated liquid; the last one is preferred.

Referring now to Fig. 5, a short shelter is indicated generally at 80. The short tree shelter 80 is similar to the shelter 10, except that it is only a fraction as long, preferably a few inches up to approximately 1 foot long. The short shelter 80 is very well suited for use in covering and protecting large pruning scars. It can be easily applied to a pruning scar and it can be removed the following season and reused on fresh pruning scars. The shelter 80 can be made with thinner walls than the shelters 10, 30 and 50.

Although the present invention has been described in terms of specific embodiments, it is anticipated that alterations and modifications thereof will no doubt become apparent to those skilled in the art. It is therefore intended that the following claims be interpreted as covering all such alterations and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A tree shelter comprising
a tube shaped piece of resilient, polymeric
5 material having a longitudinally extending slit defined
by first and second edges of said material, said tube
shaped piece, in a relaxed state and in the absence of
extraneous retainers and the like, having overlapping
portions adjacent said first and second edges so that
10 said first edge is positioned inside of said tube
shaped piece and said second edge is positioned outside
of said tube shaped piece,
apertures provided in said tube shaped piece
for receiving one or more support ties for
15 securing the shelter to a support such as a post,
stake or the like, said apertures being
positioned, relative to said edges, so that, when
the shelter is secured by one or more support ties
to a support, the shelter can be opened by moving
20 said first and second edges apart and wherein,
when the edges are released, the shelter returns
to its relaxed state in which it has overlapping
portions.
- 25 2. The tree shelter claimed in claim 1 which further
comprises at least one longitudinally extending support
engaging surface for engaging at least one surface of a
support such as a post or the like.
- 30 3. The tree shelter claimed in claim 2 which comprises two
adjacent longitudinally extending support surfaces for
engaging two surfaces of a support such as a post or the
like.
- 35 4. The tree shelter claimed in claim 1 wherein said
polymeric material is extruded polyethylene.
5. The tree shelter claimed in claim 2 wherein said

polymeric material is extruded polyethylene.

6. The tree shelter claimed in claim 3 wherein said polymeric material is extruded polyethylene.

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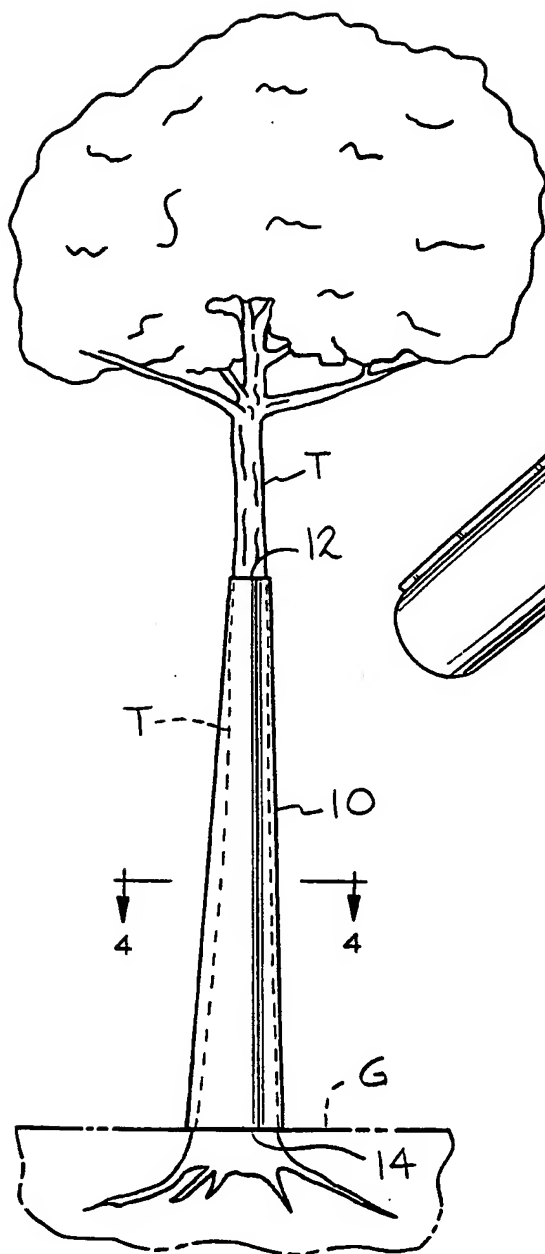


FIG. 1

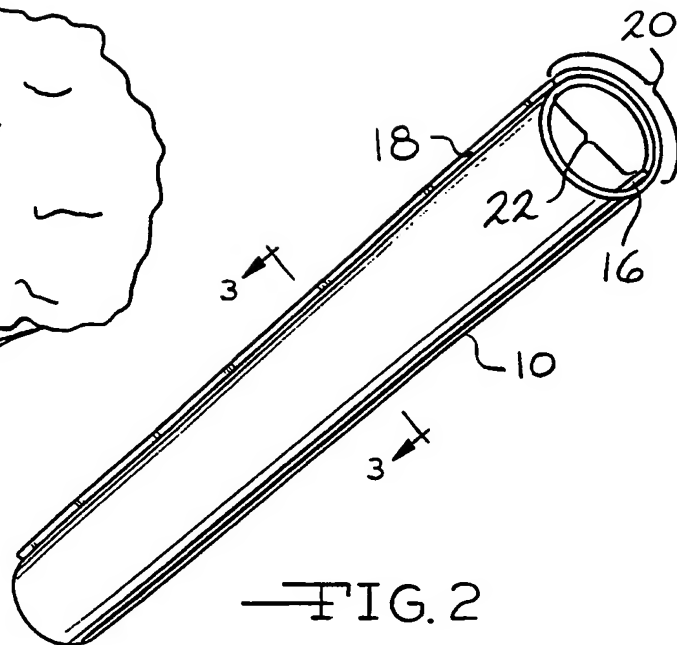


FIG. 2

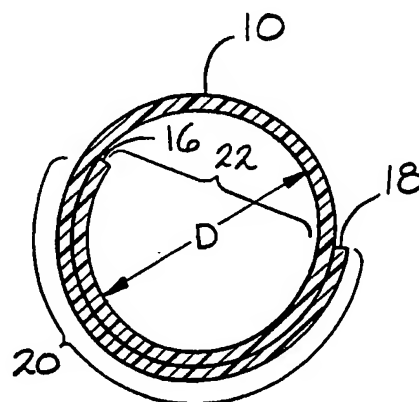


FIG. 3

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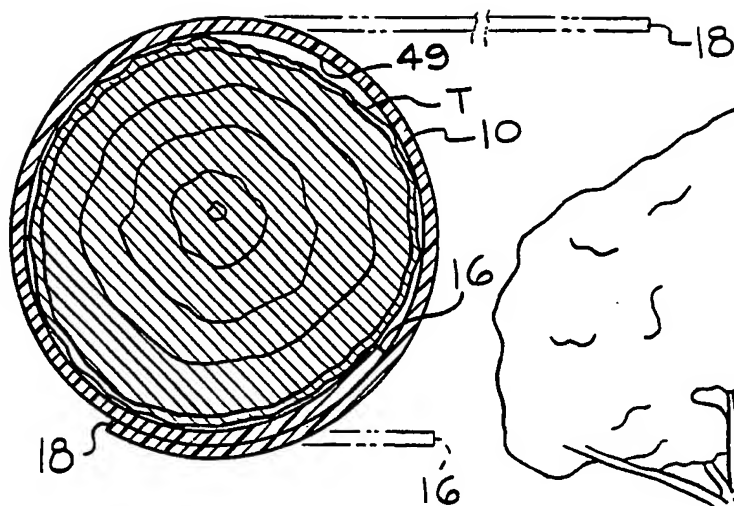


FIG. 4

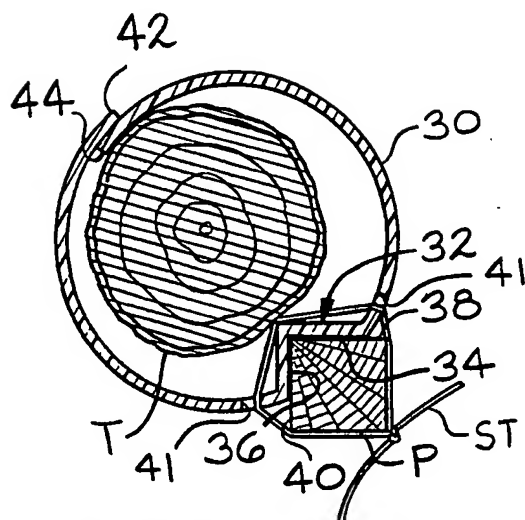


FIG. 6

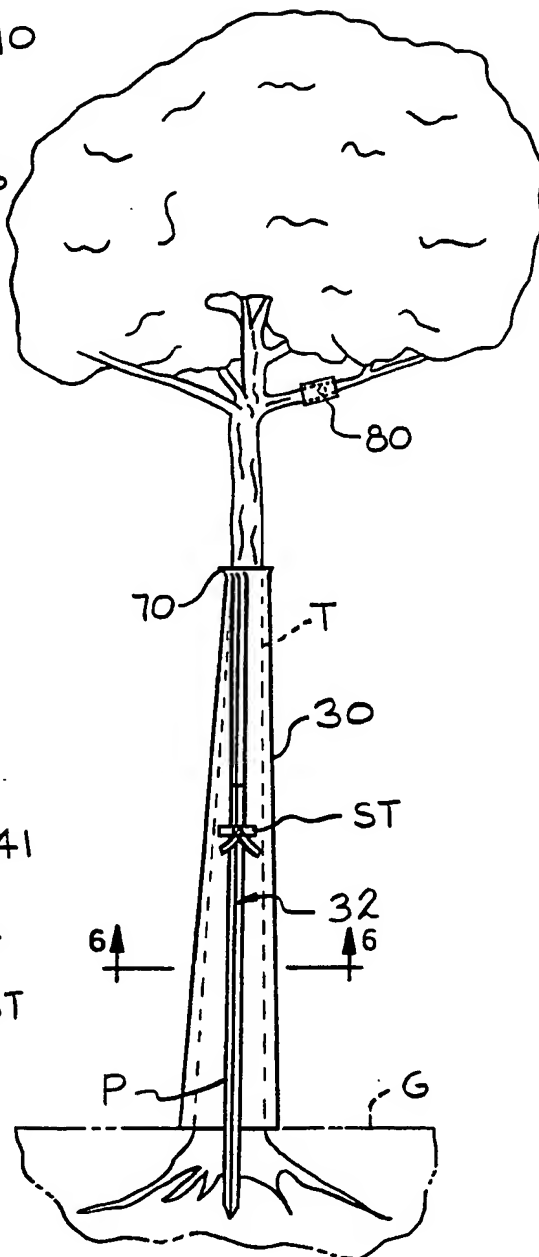


FIG. 5

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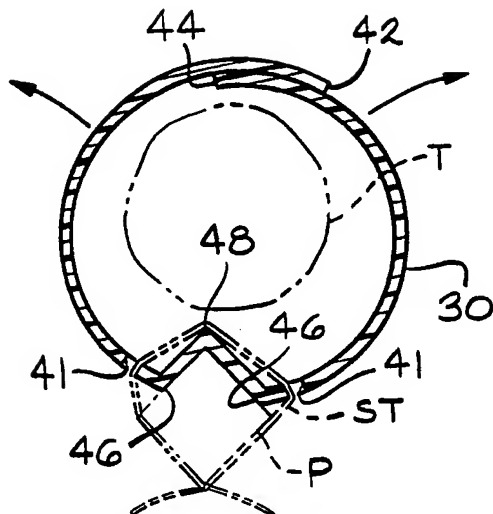


FIG. 7

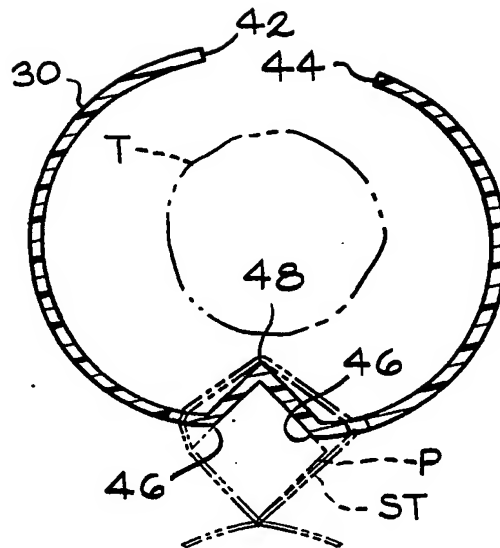


FIG. 8

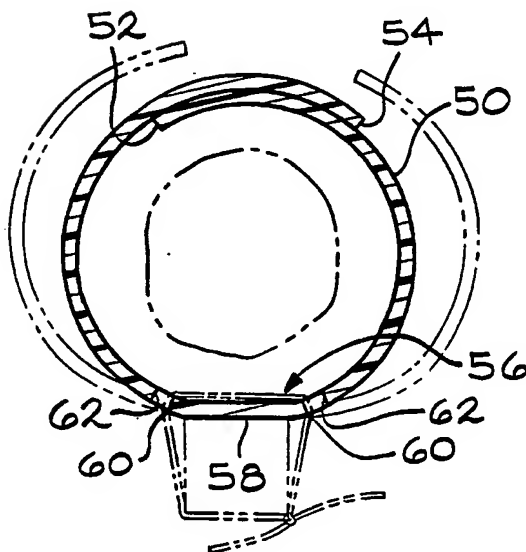


FIG. 9

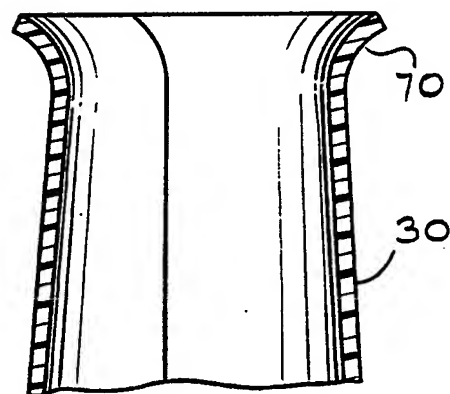


FIG. 10

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INTERNATIONAL SEARCH REPORT

PCT/US92/07052

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) :A01G 13/02,17/00

US CL :47/24,52/101,147

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 47/24,52/101,147

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
<u>X</u> Y	GB,A 2,212,043 (TULEY), 19 JULY 1989.	<u>1-3</u> 4-6
A	US,A, 107,960 (D.R. PRINDLE), 04 OCTOBER 1870.	1-6
A	US,A, 101,135 (H. KNAPP), 22 MARCH 1870.	1-6
A	IT,A, 355,567 (ESCHERT ET AL.), 11 JANUARY 1938.	1-6
A	DE,C, 914,797 (FREIST), 08 JULY 1954.	1-6
A	DE,A, 359,255 (LAHR), 21 SEPTEMBER 1922.	1-6
A	FR,B, 628,726 (BRUNEL ET AL), 28 OCTOBER 1927.	1-6

☒ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US92/07052

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	SU,A, 65,697 (DIETRICH), 20 NOVEMBER 1969.	1-6

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